

CLAIMS

1. 1. A system for varying the temperature of a wafer comprising:
  2. a first temperature controlled plate;
  3. a second temperature controlled plate comprising proximity pins, the wafer located between the first and second temperature controlled plates and distanced from the second temperature controlled plate by the proximity pins; and
  6. an enclosure surrounding the first and second temperature controlled plates and the wafer, the enclosure comprising a gas input and output, the gas flowing from the input past the wafer and to the output.
1. 2. The system of claim 1 wherein the first temperature controlled plate further comprises proximity pins, the proximity pins configured to distance the wafer from the first temperature controlled plate.
1. 3. The system of claim 2 wherein the proximity pins are moveable such that the distance of the first and second temperature controlled plate from the wafer may be varied.
1. 4. The system of claim 1 further comprising a flow distribution manifold configured to distribute the gas upon the wafer.
1. 5. The system of claim 4 wherein the flow distribution manifold comprises laminar flow paths, each laminar flow path comprising a laminar flow element controlling the flow rate of said flow path.
1. 6. The system of claim 5 wherein the laminar flow element comprises a channel formed in a substrate.
1. 7. The system of claim 5 wherein each of the laminar flow paths further comprise a cavity such that any contaminants or solvents that may be present in the

3      enclosure and that may enter the flow paths will accumulate in the cavity rather than  
4      in the laminar flow elements.

1      8.      The system of claim 4 wherein the flow distribution manifold is in contact  
2      with the first temperature controlled plate, and wherein the gas distributed is at  
3      substantially the same temperature as the first temperature controlled plate.

1      9.      The system of claim 8 wherein the first temperature control plate comprises  
2      flow channels and wherein the gas flows from the manifold and through the channels  
3      to the wafer.

1      10.     The system of claim 1 further comprising a gas output flow regulator.

1      11.     A device for controlling the temperature of a wafer comprising:

2              a temperature control element; and

3              a gas distribution system configured to distribute gas at different points about  
4      a surface of the wafer, the gas distribution system comprising a plurality of flow  
5      paths, each of the plurality of flow paths comprising a laminar flow element,

6              wherein the wafer is located between the gas distribution system and the  
7      temperature control element.

1      12.     The device of claim 11 wherein the gas distribution system is temperature  
2      controlled thereby providing substantially uniform temperature distribution and gas  
3      flow distribution across the surface of the wafer.

1      13.     The device of claim 11 further comprising an exhaust system configured to  
2      regulate the exhaust flow rate of the gas.

1      14.     The device of claim 11 wherein the gas distribution system comprises one or  
2      more heating and cooling elements.

1      15.     The device of claim 12 wherein the gas distribution system and the  
2      temperature control element can be adjusted to different temperatures in order to vary  
3      the temperature gradient within the device.

1 16. A method of conditioning a wafer having a first and a second side within a  
2 chamber, the method comprising:

3 heating or cooling the wafer from the first side;

4 heating or cooling the wafer from the second side;

5 applying gas to the first side of the wafer, the gas distributed through a  
6 plurality of passages such that the gas flow is substantially laminar.

1 17. The method of claim 16 further comprising heating or cooling the gas such  
2 that the gas is heated or cooled to substantially the same temperature as the first side  
3 of the wafer.

1 18. A post exposure bake chamber comprising:

2 a first heating plate;

3 a second heating plate;

4 the first and second heating plates configured to heat a wafer placed between  
5 the plates, the wafer spaced from the first and second heating plates by proximity  
6 pins.

1 19. The post exposure bake chamber of claim 18 further comprising a flow control  
2 system having distributed gas flow paths and one or more flow control elements  
3 regulating the gas flow rate through the gas flow paths.

1 20. The post exposure bake chamber of claim 19 wherein the flow control system  
2 is in contact with the first heating plate such that the gas is heated by the first heating  
3 plate.

1 21. The post exposure bake chamber of claim 19 wherein the gas passes from the  
2 flow control system through passages in the first heating plate to the wafer.

1 22. The post exposure bake chamber of claim 19 wherein the flow control system  
2 comprises a flow channel plate, the one or more flow control elements formed in the  
3 flow channel plate.

1 23. A wafer conditioning chamber comprising:  
2 a first means for changing the temperature of the wafer at a first side of the  
3 wafer;  
4 a second means for changing the temperature of the wafer at a second side of  
5 the wafer; and  
6 a gas distribution means for distributing a gas at a controlled flow rate at a  
7 plurality of locations upon the first or second side of the wafer.

1 24. The wafer conditioning chamber of claim 23 wherein the gas temperature is  
2 manipulated by the first or second means for changing the temperature of the wafer.  
1 25. The wafer conditioning chamber of claim 24 wherein the gas distribution  
2 means comprises flow control means for controlling the flow rate of the gas.

1 26. A system for varying the temperature of a wafer comprising:  
2 a first temperature altering device;  
3 a second temperature altering device, the wafer located between the first and  
4 second temperature altering devices; and  
5 an enclosure surrounding the first and second temperature altering devices and  
6 the wafer, the enclosure comprising a gas input and output, the gas flowing from the  
7 input past the wafer and to the output,  
8 the system operable to vary a rate of closure of any of the first or second  
9 temperature altering devices or the enclosure to adjust the temperature of the wafer.

1 27. The system of claim 26 wherein the system is further operable to vary a rate of  
2 change of the temperature of the wafer by adjusting the rate of closure.

1 28. The system of claim 26 wherein the enclosure comprises an upper portion and  
2 a lower portion, and wherein the system is operable to vary a rate of closure of the  
3 upper or lower portion.

- 1      29.     A device for controlling the temperature of a wafer within an enclosure having
- 2     a first and second enclosing structures, the device comprising:
- 3         a temperature control element; and
- 4         a gas distribution system configured to distribute gas at different points about
- 5     a surface of the wafer, the gas distribution system comprising a plurality of flow
- 6     paths, and a laminar flow element,
- 7         wherein the wafer is located between the gas distribution system and the
- 8     temperature control element, and
- 9         wherein the device is operable to adjust the rate of opening and closure of the
- 10    enclosure by varying one or more rates of movement of the first or second enclosing
- 11    structures.